

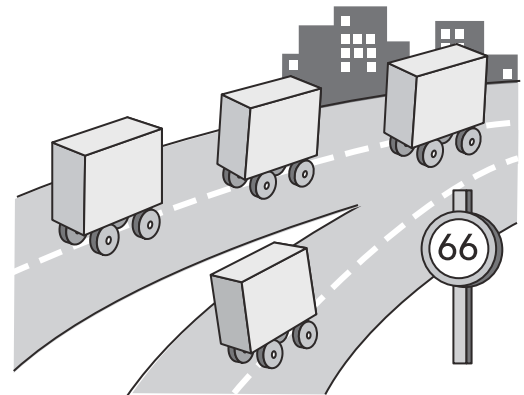
## Information Highways

### How do computer networks and the Internet relate?

The Internet is a worldwide network made up of smaller computer networks. The computer you use to get online is part of one of these smaller networks. Once connected, you can send information to any computer anywhere on the Internet, and receive information back—even on the other side of the world! Networked computers communicate through telephone lines, cables, wireless, and satellite links. You can think of all these connections as roads and highways.

### How does information travel on the Internet?

Computers break information into small chunks, called **packets**. Even a brief E-mail is broken down into packets. Each packet travels along the Internet on its own. When the packets reach their destination, they're put back together. Often, a packet gets lost. Even before you know it's missing, it's sent again and joins the other packets.



Packets do not travel directly from one computer to another on the Internet. They travel through machines called **routers**. A router is like a traffic cop at a busy intersection. It reads the “address” on each packet and decides what path the packets should travel. Packets sent to far off computers may go through many routers.

### What happens when there is a traffic jam or a router breaks?

Sometimes, many packets arrive at a router at the same time. When this happens, there is a traffic jam, also known as a **bottleneck**. Some packets get through right away. Others slow down and have to wait their turn. Nearby routers find out about the bottleneck and send packets along a different and faster route.

If one router breaks down, the packets are sent to another router. Even though their route is slightly different, they still get to their destination. That's one of the coolest things about the Internet—it really can't completely break down.

### How does the Internet grow?

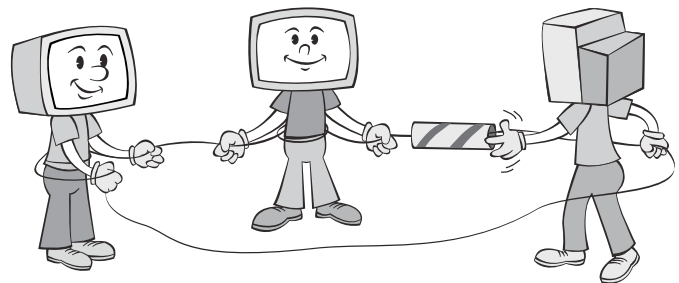
The Internet was designed to grow easily. Each time another school or library somewhere in the world gets wired, a new network is added to the Internet. As small networks are added, the Internet grows. Today, there are over a billion people connected. How many will there be in the future?

## Make a Model

Model how packets travel on networks and the Internet. You will be either a computer on a network or a router that connects one network to another. Use string to represent connections and straw pieces sliding along the string to represent traveling packets.

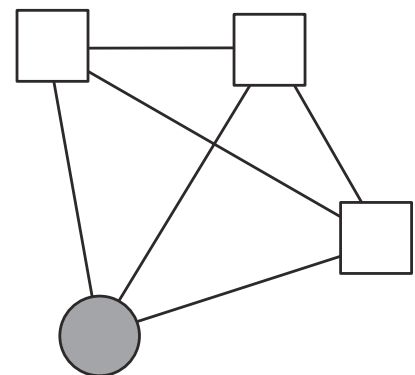
1. Form groups of four students. In each group, three students represent computers and one represents a router. (The “router” joins the model at Step 4. The person to be the “main router” joins at Step 7.)

2. Each computer gets a piece of string. In each group, model a small network of three computers, as shown in the picture.



3. Each computer now gets a straw segment (a “packet”) and writes the name of another computer on it. Then, put the packet on your string and send it to its destination.

4. Each router gets three pieces of string and uses it to connect to each of the computers in its network.



5. Now each router gets a fourth piece of string. Share the strings so that you can connect with two other routers.

6. If you are a computer, address and send a packet to a computer on one of the other two networks.

□ = computer      ● = router

7. One student in the class, the main router, will connect only to other routers. Have the main router use six pieces of string to connect to each of the other routers.

8. Now send packets from computers on one side of the model to computers on the other side of the model.

Name \_\_\_\_\_ Date \_\_\_\_\_

1. How do information packets get from one computer to another within a single network?

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2. How many routers does a packet have to pass through to get from one side of the model to the other?

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3. What would cause a traffic jam (or bottleneck) at a router?

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